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OF CHYMICAL *and* MINERALOGICAL NOMENCLATURE. *By* RICHARD KIRWAN, *Eſq;* *L.L.D. F.R.S. and P.R.I.A.*

Read March 24th 1800.

THE names given to the different ſubſtances known in common life, whether occurring in nature or produced by art, are coeval with languages themſelves, and whether all were merely conventional or ſome of them grounded on ſome relation to the thing ſignified is now of little importance to inquire, as from long habit both are equally immediately referred to the thing ſignified, without any reflexion on the original reaſon of their impoſition. Thus though the name *barometer* was originally impoſed on the inſtrument ſo called, becauſe the terms that compoſe this name *Baros* and *Metron* denote its uſe in meaſuring the weight of the atmoſphere, yet the name is juſt as well underſtood by thoſe who are totally unacquainted with its etymology as by thoſe to whom this is perfectly known. The inſtrument itſelf and not its uſe is denoted by the name, and equally occurs to both; the workman who knows not its uſe knows what the name immediately ſignifies as well as the philoſopher who employs it, and as well as the German who calls it a *ſchwermeſſer*, whoſe primitive components alſo expreſs its uſe, nor is it better underſtood by either than the name *ſcrew* or *ſchraube*, which cannot be reſolved into any primitive component terms. Who on hearing the Latin name of a book ever thinks of its primitive ſignification—the bark of a tree? Languages muſt have been invented long before either chymiſtry or mineralogy were in any degree cultivated. In both the analytic and ſynthetic branches of chymiſtry as well as mineralogy, many ſubſtances muſt have occurred to which in common language no name was applied, yet the neceſſity of denoting them by ſome name was urgent. Here then a difficulty occurred, which ſome ſought to ſurmount by a name *arbitrarily* impoſed, others by names derived from ſome real or fanciful relation of the given ſubſtance to ſome uſe, object, perſon, or particular quality or circumſtance. Thus in chymiſtry *alcohol* appears to be a name arbitrarily impoſed on highly rectified ſpirit of wine or very ſubtle powder.* *Mercurius vitæ* denotes an antimonial preparation of great efficacy; as *Kermes mineral* does one that reſembles that ſubſtance in colour; *Glauber's ſalt*, a particular ſubſtance firſt formed by Glauber; *Epſom*, a ſalt firſt diſcovered in the ſprings near that town, &c. So in mineralogy, *quartz* ſeems to be a name arbitrarily impoſed, and *ſpath*, a name originating from the reſemblance of the integrant *lamellæ* to a blade, and *ſelenite* from ſome fictitious reſemblance to the moon. The Etimology of theſe names was however ſoon forgotten or not attended to, and conſequently ſuch of them as conſiſted of only one word, not evidently denoting ſome falſe relation, might without inconvenience be admitted; but in proceſs of time deſcriptions were admitted inſtead of names, and theſe often falſe or abſurd, as *ſal mirabile*, *ſal ſecretum*, *arcanum duplicatum*, *arcanum corrallinum*, &c. The inconvenience and evident impropriety of many of theſe deſignations at laſt attracted the attention of thoſe eminent philoſophic chemiſts, Bergman and Morveau. Morveau ſo early as the year 1782 publiſhed an excellent Memoir on this ſubject in Rozier's Journal, and his ſentiments met with the entire approbation of Bergman. The new denominations he ſought to introduce ſoon however gave way to the ſtill more exquiſitely deviſed ſyſtematic appellations grounded on the diſcoveries of Lavoiſier, and the total elimination of the phlogiſtic element formerly admitted. Theſe, in the formation of which Morveau alſo, in concurrence with a few of the moſt eminent Pariſian chymiſts, bore a conſiderable part, were ſince admitted and recognized by moſt European chymiſts, and particularly in England. The exceptions that appeared to me reaſonable to the general rules laid down by this highly reſpectable aſſociation, or to ſome of the terms they introduced, I thought of too little conſequence to mention, knowing that the few antient denominations I retained, and the ſtill fewer new ones I introduced, were perfectly intelligible, nor ſhould I attempt at preſent to vindicate them had I not perceived they attracted the cenſure of many on whoſe eſteem I ſet the higheſt value. Thus circumſtanced I feel myſelf juſtified in examining the general propriety of thoſe rules and aſſumed principles from which I thought proper to deviate, and of the denominations which I reject.

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* Some derive it from the Arabic *Kahala* exaruit.

The firſt principle laid down by M. Morveau is, " that phraſes " are not a name, that ſubſtances and chymical products ſhould " be denoted by names fit to indicate them on every occaſion, " without having recourſe to circumſtances, p. 373;" to this principle I give my intire aſſent.

Another rule laid down by M. Morveau is, " that in chuſing " denominations we ſhould prefer thoſe which have their roots " in the dead languages more generally known, in order that " the ſenſe ſhould ſuggeſt the name, and the name the ſenſe." It is for this reaſon combined with the firſt that I prefer ſingle names already underſtood and well known by all thoſe that have attained any knowledge of chymiſtry to new names derived from the Greek or new unknown barbarous Latin names. Hence I prefer the term *hepar*, denoting in all chymical authors a combination of ſulphur to every baſis except a metallic, to the barbarous unknown Latin term *ſulphuret;* and with reſpect to metals I prefer the well known terms *pyrites* and *galena* to the newly deviſed *ſulphuret of iron*, or *copper*, or *lead;* the former has the advantage of denoting the particular ſpecific combinations of ſulphur with iron, copper, arſenic or cobalt, and of excluding not only other ſulphurated metals that do not give fire with ſteel, as the vitreous ſilver ore, ſulphurated antimony, or lead, cinnabar, blende, ſulphurated biſmuth, &c. but alſo ſuch compounds even of copper and ſulphur as do not give fire with ſteel, as the vitreous copper ore and the grey copper ore and the purple. On theſe and many other conſiderations which will preſently be mentioned, I hope the ingenious M. Muſhet will recal his wiſh that I had modelled my nomenclature on the principles of the French School, 2. Phil. Magaz. p. 156. C. Faujas though of that ſchool remarks that theſe uſual names (when otherwiſe faultleſs) cannot without great inconvenience * be changed for others either erudite or barbarous, 35. Journ. des Mines, 894. Nor is his opinion in the

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* This puts me in mind of ſome Latin puriſts who change known modern names into what they eſteem purer Latin ones. Thus inſtead of *cancellarius* they ſay *præfectus juris*, and for which Lipſius Not. ad Lib. I. Politicorum Cap. 9° juſtly cenſures the hiſtorian Paulus Æmilius. “ Vetuſtatis etiam neſcio quid affectat in “ nominibus hominum, locorum, urbium immutandis et in veterem formam redigendis, ſæpe erudite, interdum vane, ſed ut ego judico, ſemper indecore, quorſum “ *chartierius*, Gallorum cancellarius, *quadrigarius* mihi fit? et ille ipſe cancellarius “ appellatur *præfectus juris?* et ubique Rex *Tarraconenſis*, qui nobis et majoribus “ fuit Arragoniæ? talia infinita ſunt *audacter* et *ambitioſe* innovata et cum fraude “ pariter ac *cruce* lectoris. The Greek and Roman hiſtorians were frequently guilty of the ſame fault which occaſions at this day much perplexity.

leaſt invalidated by the note of C. Coquebert, who aſſerts that the new are more exact, ſonorous and ſignificative; for any term is exact and ſignificative when it denotes without obſcurity or ambiguity the thing ſignified; and as to *ſound* it may deſerve attention in poetry, but ſurely, if not exceeding uncouth, it deſerves none in ſcience. He acknowledges that theſe alterations may cauſe ſome embarraſſment to the preſent race of men, but thinks that ſucceeding generations will bleſs thoſe that introduced them; I think on the contrary that they will curſe them for obliging them to learn both the new and the old denominations under the penalty of not underſtanding Stahl, Henckel, Margraf, Lemery, Geoffroy, Duhamel, Macquer, Bergman, Scheele and many others of the higheſt merit; can any one be ſo arrogant as to pretend that theſe immortal authors can become unintelligible without prejudice to the ſcience? is it poſſible that muſicians ſhould judge more ſhrewdly than thoſe who profeſs to be philoſophers? yet theſe have rejected all the modern alterations of notation that have been propoſed to them, though attended with ſome advantages, from the ſingle conſideration that if new modes were adopted the inimitable compoſitions of the laſt and preſent age would either ſoon become unintelligible, or the arduous taſk of learning both methods of notation would be impoſed on all ſucceeding generations. I am not however for the total excluſion of the term *ſulphuret*; let it be employed to denote the compoſition of ſulphur with any baſis *in general*, whether alkaline. earthy, metallic, oleaginous, ſpirituous or carbonaceous; in this moſt extenſive ſenſe the old nomenclature ſupplied no term, and yet ſome name was wanting; in this ſenſe therefore it may be retained.

ANOTHER general maxim advanced by M. Morveau is, that "the denomination of a chymical compound is neither clear nor "exact except it expreſſes by names conformable to their nature "the ingredients that enter into that compound." This maxim, unhappily too eaſily adopted by the French School, tends to the ſubverſion of the received language of all ſciences, and even of common life. By this rule we are to baniſh the name *water*, and inſtead of it ſubſtitute its component ingredients *hydrogenated oxygen* or *oxygenated hydrogen* *; and inſtead of *ice* we are to ſay *decaloricated, hydrogenated oxygen*, and for *ſteam*, *caloricated hydrogenated oxygen*. Inſtead of common *ſoap* we are to ſay *oleaginated ſoda*, and for *glaſs*, *ſilicited alkali*, &c.

THE French chymiſts it is true retain the name *ſoap*, but in contradiction with their own principles; for they ſurely cannot in this word diſcover the radicals of its compoſition. (Nay Lavoiſier

retains

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* Fourcroy expreſsly ſays water may be called *oxide* of *hydrogen*. See St. John's method of nomenclature, p. 64.

retains the old word nitre and ſalt peter conjointly with that of *nitrat* of *potaſh*, ſee his Treatiſe of Chymiſtry, vol. I. p. 79 and 232, French) and yet they diſapprove of my retaining a few of the antient denominations that were as well known to all chymiſts as the names *ſoap* or *glaſs* in the language of common life, ſuch as *Glauber*, *Epſom* and *Sylvian* (rejecting only the term ſalt uſually tacked to them; but evidently ſuperfluous) alſo ſelenite, gypſum, borax and alum, theſe I retain for two reaſons, firſt, becauſe they expreſs their reſpective objects by a *ſingle* name, which appears to me a conſiderable advantage, and ſecondly, becauſe thoſe names continually occur in all treatiſes of chymiſtry publiſhed before the year 1790, and in many ſince, and conſequently muſt be known by all who wiſh to underſtand them.

Morveau and the French School in general reject the names of inventors "as having no conformity either generic or individual with things," and for the ſame reaſon they ſhould reject the names *Alexandria* and *Conſtantinople* derived from the founders, and in general, by the ſame rule, all names of places ſhould be changed for ſuch as would expreſs their ſituation. Is it not therefore evident that when the ſignification of names is already fixed and generally known, that they ſhould be retained*,

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[*] 19 Rox. p. 374.

tained, the inconvenience of rejecting them being far ſuperior to any advantages propoſed by the change? yet ſtrange to tell they object to a few new names which I introduced in mineralogy though exactly founded on their own principles and not attended with any inconvenience, as they denote objects not known by any denomination previouſly aſſigned to them, and even poſſeſſing peculiar properties of great importance. Thus they diſapprove * of the name *muricalcite*, a name which I thought proper to beſtow on ſuch limeſtones as contain a notable proportion of magneſia, and *baryto calcite* on ſuch as contain a notable proportion of barytes, theſe ſtones having been diſtinguiſhed by no name, and theſe new names being in conformity with the principles of the French ſchool derived from and grounded on their component ingredients.

Mr. Tennant has ſince ſhewn in an important paper in the Philoſophical Tranſactions for 1799 the evident neceſſity of diſtinguiſhing theſe *muricalcites* from common limeſtones with which they have always been confounded; and from the deleterious properties which barytic lime water poſſeſſes it is evident that the limeſtones that contain any proportion of barytic earth cannot without danger (ſometimes to human life) be confounded with common limeſtones. The ſtone which the Germans without any inconvenience called *apatite*, approaching in our language too nearly the word *appetite*, I have called *phoſphorite* to mark its compoſition; but as the phoſphoric acid has alſo been detected or at leaſt ſuſpected in compoſition with argil, to diſtinguiſh this compound from the former I call it *phoſpholite*, a name better ſuited to it than that of *valentia garnet*, by which it was formerly denoted, a change attended with no inconvenience, as the ſtone itſelf was known in no part of Europe but Spain. To theſe denominations they object their *mononotous terminations*; but theſe terminations are beſt ſuited to our language; they do not recollect that the terminations in *at*, as *nitrats*, *ſulphats*, *muriats*, *carbonats*, *phoſphats*, *oxolats*, &c. &c. are equally monotonous in theirs. They think, or rather magiſterially decide, that minerals ſhould be denoted by the ſame name, as ſimilar chymical compounds; a rule that might be admitted if ſuch minerals were not previouſly generally known by other ſingle appellations, and if their compoſition was perfectly ſimilar to analogous chymical compounds. But in the firſt place ſeveral minerals are already generally known by peculiar proper denominations, for inſtance, *cinnabar*, ſurely a more convenient name than the drawling new name *ſulphurated red oxide of mercury*, and in the next place they ſhould conſider that chymical compounds being artificial productions may contain only thoſe ingredients which their compound names import. But minerals whoſe principal compoſition is analogous, often contain other ſubſtances alſo, which the new chymical name would not expreſs, and would thus lead to important miſtakes. Thus, for inſtance, *phoſphorite* is commonly contaminated with ſilex, aerated lime, muriated lime and iron, and ſometimes with manganeſe and fluor; whereas the analogous chymical compound on which the name phoſphorated lime is properly impoſed, is free from ſuch contaminations. Subſtances therefore ſo different ſhould certainly be diſtinguiſhed by different names, or at leaſt the word *natural* or *native* muſt be tacked to the name of the chymical compound; and though with reſpect to foſſile metallic chymical compounds this inconvenience may often be avoided by the addition of the word *ore*; yet here alſo the antient name often expreſſes ſome other inherent property, thus the term *vitreous* added to ſilver ore denotes not only the compoſition but alſo the eaſy fuſibility of that particular ore.

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* 23 Ann. Chym. p. 103.

Another inconvenience ariſing from denominations aiming to expreſs the compoſition of the objects on which they are beſtowed, is, that they often cannot expreſs the proportion of the compounding ingredients without conſiderable embarraſſment; this proportion nevertheleſs is a circumſtance often of great importance, as it induces an important difference in their properties, and the embarraſſment is greater when the compounding ingredients are numerous. To obviate the firſt, in one particular inſtance, the French ſchool have very properly aſſigned different names to compounds holding different proportions of oxygen and poſſeſſing different properties in virtue of that difference of proportion, as *acids* and *oxides*; but ſeveral of the vegetable acids differ from each other only in the proportion of ingredients, which cannot, even if fully known, be expreſſed in detail on every occaſion. So to obtain a diſtinct knowledge of the various combinations of ſulphur or ſulphur and hydrogen with different baſes is of the utmoſt conſequence to any one that wiſhes to obtain any inſight into the phænomena preſented by mineral waters during their analyſis, or of the nature of other ſulphurated compounds; on this obſcure and intricate inveſtigation, moſt certainly the eminent abilities of Fourcroy, and the conſummate ſkill and ſagacity of Berthollet and his aſſociate Welter have thrown the cleareſt light, yet I muſt own that the terms employed by the two laſt to denote the different compounds appear to me very perplexing, though the beſt that could be choſen on the principles of the new nomenclature.* I flatter myſelf therefore that a ſhort explanation of them, and of the names I would wiſh to ſubſtitute in their room, will not be unacceptable nor out of place on this occaſion.

Sulphure,

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* See 25 Ann. Chym. p. 230. and 3. New. Rox. Jour. p. 436.

Sulphure, Sulphuret of the Engliſh.

By this the *French* underſtand the compound of *ſulphur ſingly* with any baſes except hydrogen; theſe compounds I call *hepars* if unmetallic, but if metallic I apply their antient names.

Hydrogene Sulphuré, Sulphurated Hydrogen.

This complex denomination expreſſes the union of ſulphur with hydrogen. I call it by its antient name, hepatic air.

Souffre Hydrogené

This term expreſſes the union of ſulphur with hepatic air, the ſulphur abounds and it does not form a permanent air, but aſſumes an oily form. Engliſh neologiſts would, I preſume, have called it *hydrogenated ſulphur*; it is plain that this name does not expreſs all the ingredients, for it is to hepatic air and not merely to hydrogen that the ſulphur is united; I call it therefore *hepaticated ſulphur*.

Hydro Sulphure.

Hepatic air is capable of uniting to various baſes, and even precipitates ſulphur from them if previouſly united to them; on theſe compounds Berthollet beſtows the above denomination. The Engliſh, I ſuppoſe, would call them *hydroſulphurets;* I call them *hepatules*.

Sulphure Hydrogené

This denotes the union of hepaticated ſulphur (ſouffre hodrogené) with any baſis; the Engliſh, I ſuppoſe, would call theſe compounds *hyrogenated ſulphurets*; this appellation does not expreſs the compoſition. I employ the term *hepaticated* to expreſs this compoſition. Berthollet has diſcovered that fixed alkaline hepars when diſſolved, or even moiſt, are always in this ſtate, and conſequently that an alkaline hepar cannot exiſt but in a dry ſtate.

In the caſe before us we ſee the confuſion and perplexity occaſioned by a ſtrict adherence to the rule recommended by Lavoiſier,* that a conformity or connexion ſhould be maintained between the names of a baſis and its compounds; in ſome caſes it is highly proper, and hence the different degrees of oxygenation of certain acids are very properly indicated by a ſlight alteration of the termination of the name of each, as *ſulphureous* and *ſulphuric*; but theſe names indicate only *extreme ſtates*, the firſt only the ſmalleſt degree of oxygenation conſtituting an acid, and the laſt the ſtate of *perfect ſaturation*; now this ſame acid commonly occurs in neither of theſe ſtates, but in a ſtate participating more or leſs of both; theſe names therefore applied to it when thus circumſtanced are falſe, and as in this intermediate ſtate it has always been known by the name of *vitriolic acid*, I think this name ſhould ſtill be retained. Nay the ſulphureous acid is itſelf capable of two very different ſtates, as may be ſeen in the 6th vol. of De Machy's Edition of Junker, p 143. So the term *nitric* is very proper to denote the full ſaturation of the nitrous baſis with oxygen. But the term *nitrous*, employed to denote the ſmalleſt degree of oxygenation neceſſary to convert this baſis into an acid, is improper, as it has evermore conveyed a different idea. Hence I expreſs this loweſt extreme of oxygenation by the term *mephito nitrous*, as the radical primary baſis may be called *mephite* or mephitic air, inſtead of the new coined name *azote*. And the term *nitrous acid* may ſtill denote, as it has evermore done, the mean ſtate of oxygenation, that indeed in which it is uſually found, and for which the French School have no name but that of one or other of the extreme ſtates, which muſt therefore be falſely applied. The term *epinitrous air*, introduced by the learned and ingenious Dickſon, may be uſed to denote what Doctor Prieſtly called *dephlogiſticated nitrous air*, at leaſt until its nature is better developed.

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* Lavois. p. 72 and 73.

It is in vain that the authority of Bergman is invoked to countenance the ſuppreſſion of the antient names of Glauber, Epſom, &c. rejecting only the oſtentatious additions made to ſome of them, as *ſal admirabile Glauberi*, &c. 4 Bergm. p. 257. It is true he affirms that *the beſt names are ſuch as indicate the compoſition or ſome eſſential property*, but of this ſort he gives no example, nor rejects any old names merely on this account; on the contrary where *expreſſive names* cannot eaſily be had, he tells us it is better apply ſome that convey no determinate expreſſion, p. 259, and this is often the caſe where different proportions or numerous ingredients are to be denoted.

HENCE I am far from rejecting, but on the contrary applaud the ingenuity of the inventors of the terminations of *at* and *ite* to denote the different proportions of oxygen in the acids contained in different compounds, as *ſulphats*, *ſulphites*, *nitrats* and *nitrites*, &c. as ſuch general names were undoubtedly wanting and the old ſchool afforded none. But the welcome admiſſion of theſe does not require nor imply the diſmiſſal of ſuch of the old as were faultleſs and enfranchiſed by preſcription.

AN highly valued friend ſuggeſted to me, that the uſe of the old names was a departure from the ſyſtem on which the new denominations were founded. I replied that ſyſtems were the creatures of convenience, and ſhould be adhered to only as far as they promoted it; nitre, epſom, borax, &c. are much ſhorter (and equally well known) than nitrated pot aſh or ſulphat of magneſia, and Lavoiſier himſelf preſerves the name borax; he might as well have preſerved that of epſom.

THE 5th rule (very properly) laid down by Morveau with reſpect to names is, that they ſhould be adapted to the genius of the language; conſequently if old names be retained they ſhould be employed in the true uſual ſenſe of their known ſignification in that language, and neither extended beyond it nor reſtricted within narrower bounds; on this ground I reject the term *potaſh* employed to denote the vegetable fixed alkali in its pureſt ſtate; for that name both in Engliſh and French has always denoted an impure alkali, but the pureſt alkali of this ſort having been formerly denoted by the name of *ſalt of tartar*, a name certainly improper, I ſubſtitute in its room the unexceptionable name *tartarin*, which by its affinity to the former eaſily ſuggeſts its ſignification, and is moreover attended with a ſmooth flowing adjective *tartarinated*, which is often wanting. For the ſame reaſon I reject the name *ammonia* to expreſs the *volatil alkali*, as the name ammoniac has always been employed to expreſs the combination of a volatil alkali with an acid, and if no particular acid was expreſſed the muriatic was underſtood; inſtead of volatil alkali, which is a compound denomination, I ſubſtitute *volalkali*, whoſe ſignification cannot be miſtaken. Its adjective is not indeed quite ſo happy; inſtead then of *volalkaliſed*, I uſe the word *fuliginated*, which eaſily indicates the ſame idea. Theſe are the only new chymical names I employ.

THE term *oxide* is alſo unſuited to our language, in which it naturally expreſſes the *hide of an ox*. In pronunciation they cannot be diſtinguiſhed; in its ſtead I would uſe *oxat* or *oxidat*, and inſtead of *oxided* I would ſubſtitute *oxidated*. The application of either of theſe terms to metallic ſubſtances in an oxidated ſtate is generally ſuperfluous, as ſuch ſubſtances are already denoted and known under the name of metallic *calces*; Guyton * has lately proved that *diamonds* are the pureſt carbon, yet ſurely even the French School will not attempt to ſuppreſs that well-known name and exchange it for *carbon*. Neither, I ſuppoſe, will they call *charcoal* an *oxide of carbon*, though proved to contain ſome portion of oxygen; and for the ſame reaſon I ſhall not exchange the well-known term *plumbago* for that of *carburet of iron*, though with reſpect to ſimilar compounds of other metals the term *carburet* ſhould be employed.

THIS ſyſtem of conciliation the French School rejects with diſdain, Guyton tells us "it is ſo much more difficult to con-'ceive as it is an evident ſacrifice of principles to habits," § as if the ground of their ſyſtem of nomenclature were univerſally allowed, and afforded rules ſo ſtrict and general as to enjoy the ſingular privilege of admitting no exception! as if there was no ſuch thing as *principles of convenience*, or if there were ſuch principles,

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* It is with much regret and reluctance I mention this gentleman under this new name, as he was generally known and gained immortal fame under that of *Morveau*; hence I ſhall ſtill uſe this in quoting his former works.

§ 25. Ann. Chym. 207.

ciples, that they were to be ſacrificed to mere ſpeculative truth (if truths) of much leſs importance; a truly harſh, intolerant and deſpotic maxim! as ill calculated to point out the moſt advantageous road to ſcience, as the maxim that a ſtraight line ſhould always be followed, would be to inſure us the beſt road to the ſummit of a mountain, though preſenting in that direction a ſeries of ſcabrous and abrupt precipices; and hence departed from by Lavoiſier himſelf, as we have ſeen in the inſtances of *ſalt petre* and *borax*, and indeed by the whole French School in the inſtances of *water* and *diamond*, as already mentioned: For common ſenſe in ſome inſtance or other ſeldom fails of aſſerting its rights, yet Lavoiſier tells us he was cenſured (by ſome chymical bigots) for this condeſcenſion. The principles of religion and juſtice are the only that can in no poſſible caſe yield to conveniency.

AMONG many juſt reflections that occur in the preface to Lavoiſier's celebrated elementary treatiſe of chymiſtry, there are ſome connected with this ſubject that appear to me not quite correct. Thus, p. x. (of the original) he tells us " that the only " way of avoiding theſe errors (unfounded hypotheſes) is to ſup- " preſs reaſoning, or at leaſt to ſimplify it as much as poſſible, as " it proceeds from us, and can alone lead us aſtray; to try it al- " ways by the teſt of experiment, to preſerve only the facts, " which are the *data* given by nature and which cannot deceive " us; to ſeek for truth only in the natural concatenation of ex-

"periments and obſervations, as mathematicians arrive at the ſo-" lution of a problem by the ſimple arrangement of the data, &c." From this paragraph we might be led to conclude that all reaſoning ſhould be baniſhed from chymical inveſtigation, or at leaſt, that only the ſimpleſt ſhould be admitted; yet it may eaſily be ſhewn that the moſt ſignal inſtances of ſucceſsful chymical inveſtigation in the obſcureſt ſubjects, and the happieſt diſplay of chymical ſagacity, are the reſults of very complicated reaſoning. Such is Berthollet's theory of aqua regia, Berthollet and Welter's obſervations on hepatic air, Fourcroy's on hepatic waters, Vauquelin's theory of the mutual decompoſition of nitrous air and the ſolution of vitriol of iron,* moſt of Scheele's and many of Klaproth's Analyſes, and a few others.

The juſt arrangement to which mathematicians owe the eaſy ſolution of their problems is itſelf the reſult of profound reaſoning, as is evident in the formation of equations. But the modes of reaſoning employed in the ſolutions of mathematical and chymical problems cannot properly be compared, the former being founded on the relation of identity or equality, and the latter on that of cauſe and effect.

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* All foreign chymiſts are infinitely obliged to him for giving the old denominations of weights and meaſures inſtead of *centimetres*, &c. Chymiſtry aims at enlightening the world, and not Frenchmen alone; it ſhould therefore ſpeak a language univerſally underſtood, and ſhake off the yoke of national pedantry.

PAGE vi. he tells us "it is the ſeries of facts that conſtitutes "ſcience." I ſhould rather ſay it was a knowledge of the relation that ſubſiſts between the facts that occur; but neither the facts themſelves can often be diſcovered without much ſubtle reaſoning, nor can they be marſhalled in a luminous ſeries without diſcovering the reciprocal relations of the component ingredients of compound ſubſtances to each other, a diſcovery which often requires an elaborate train of reaſoning.

LASTLY, both he and Morveau tell us that the memory of learners is ſingularly relieved by compound denominations expreſſing the component ingredients of each compound. In reply to which, I ſay, that the ſcience is not to be charged with a cumberſome train of words merely to gratify the indolence of beginners; are we then on every occaſion to ſubſtitute the definition of words for the words themſelves? are we, in imitation of the Germans, to ſay a *handſhoe* inſtead of a *glove*? Helvetius has long ſince remarked, that every man of common underſtanding poſſeſſes ſufficient power of memory to retain the ſignification of moſt words in his own, and often of thoſe of ſeveral other languages; chymiſtry and mineralogy together ſcarcely preſent two hundred appertaining to them alone; neither the ſciences of aſtronomy, law or medicine afford fewer.

THE faſhionable rage of coining new words from the Greek, *without any neceſſity*, has been particularly baneful to mineralogy, inſomuch that foreigners, though well acquainted with the received terminology, cannot without being verſed in that language underſtand the meaning of the new-fangled terms lately introduced. It is well known that the mineralogical knowledge of all Europe is chiefly derived from the Germans and Swedes, whoſe nomenclature is in moſt inſtances the ſame, and where any ambiguity has ariſen it has been removed by the exertions of Werner. His nomenclature, where not too diſcordant with the language or at open variance with the received technical names of other countries, ſhould therefore for the ſake of preciſion and uniformity be univerſally preſerved.

Abbe Hauy, who is now preparing a treatiſe of mineralogy, of which the higheſt expectations are juſtly entertained, ſince, in addition to his own ſuperior intelligence and profound phyſical knowledge, he is aſſiſted with the chymical abilities of Guyton, Vauquelin, Deſcotilles and many others, and the extenſive reſearches of Dolomieu, ſeems convinced of the propriety of retaining the received terminology, at leaſt for the preſent, with the limitations and reſtrictions above-mentioned; for in his prefatory diſcourſe, 27 Journ. des Mines, p. 224, he tells us, " that " with reſpect to minerals of the firſt claſs (that is, conſiſting of " mere earths) he left them thoſe names which they had hitherto " borne, and did not take the liberty of impoſing new ones, " except in caſes of neceſſity, as where a new ſpecies occurred, " either formerly unknown, or comfounded with one of a different

“ nature. We have altered ſuch names only as were intolerably “ ambiguous.”

YET after this declaration we find the following new-coined names:

Teleſia—for oriental rubies, ſapphires and topazes. Thus ſapphire is called *blue teleſia*, &c.

Cymophane—for the chryſoberil of Werner.

Amphibole—for cryſtallized hornblende.

Pyroxene—alſo cryſtallized hornblende; at leaſt I have reaſon to think ſo, for of the eleven external characters of both given by La Metherie, there is only one in which they abſolutely differ, that is, the *electrical.*

Staurotide—for ſtaurolite, the name very properly impoſed by La Metherie inſtead of the compound name it bore before.

Axinite—I believe to be only a variety of thumerſtein.

Actinote—for actinolite, the termination *lite* moſt properly denoting a ſtone.

Thallite—for delphinite, the name already given it by Sauſſure.

Idocraſe—ſeems, as I conjecture (ſeeing no exact account of it) a variety of olivin.

I PASS over ſeveral new names, as *euclaſe*, *dioptaſe*, *chabaſie*, &c. as they may poſſibly denote new ſpecies, which I wiſh were ſettled in conjunction with Berthout or Van Buch, or ſome of the Wernerian School. Yet even theſe denominations we are told are only *proviſional*, being hereafter to be altered as analyſes may require.

I MUST here add, by way of note, that Citizen Guyton, in reviewing the firſt volume of my Mineralogy, 23 Ann Chy. p. 105 and 106, has fallen into two miſtakes which I am perſuaded his candour will prompt him to acknowledge. The firſt is, in ſtating that my experiments on the fuſibility of different ſtones and earths were made in limeſtone veſſels, whereas they were in Heſſian crucibles. The ſecond is, in ſtating the alleged infuſibility of barytic earth and lime as the reſult of my experiments, whereas I expreſsly quoted Lavoiſier, having myſelf made no experiments on ſuch mixtures, (See Mem. Par. 1783, p. 599 and 600.) Other writers have frequently imputed to me miſtakes of Bergman, though I expreſsly quoted him.